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(54) An antiperspirant combination containing an aluminum halohydrate and a stannic halide.

(57) An antiperspirant combination contains an aluminum halohydrate and a stannic halide and also preferably contains a neutral amino acid. The combination corresponds to the empirical composition  $[Al_2(OH)_5X.nH_2O]_a [Sn Y_4.n^1H_2O]_b [Neutral Amino Acid]_c$  wherein

- (a) X and Y are halogen;  
(b) n and n<sup>1</sup> are 0 to 6;  
(c) the ratio of weight of a/b is 0.3 to 1.8; and  
(d) the ratio by weight of c/b is 0 to 1.3.  
Material is in powder form or incorporated in liquid or solid vehicle.

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The antiperspirant combinations of the present invention are prepared by mixing the aluminum halohydrate, the stannic halide and, when employed, the amino acid in solution. It is not clear whether a true molecular complex is formed in the process or whether a simple mixture is formed. Consequently, as used herein, the term antiperspirant combination is intended to include true molecular complexes of the various ingredients or mere mixtures thereof.

The antiperspirant combinations of the present invention are generally prepared by forming a solution, usually an aqueous solution, of the ingredients in the appropriate ratios. The solution is then dried to remove the solvent and form a dry powder. Various processes are known in the art to obtain the requisite dried product. These include evaporation under vacuum, spray drying etc. The dried powder can then be used to formulate various products.

However, the solution of the antiperspirant combination described above can be used as such as an antiperspirant agent without first drying the solution to form a powder. Furthermore, when the final product is to take the form of a solution containing the solvent used to prepare the combination or to form an emulsion in which the solution of the antiperspirant combination forms all or part of a phase of said emulsion, the solution of the antiperspirant combination may also be used directly i.e. without first going through a drying step.

The antiperspirant combinations of the present invention may be used in a variety of dosage forms. Thus, they may be used in the form of simple solutions in solvents in which they are sufficiently soluble e.g. water, alcohol, hydro-alcoholic solvents. These may be dispensed by means of the conventional roll-on applicators widely used in this art or other types of applicators suitable for dispensing solutions of this character. These solutions may also be dispensed in the form of pads which have been saturated with these solutions.

The antiperspirant combination of the present invention may be used in the form of a suspension type product. In this case, the dried product could be distributed in a vehicle in which it is suspendable but not soluble. These will usually be hydrophobic vehicles which can be exemplified by such materials as silicones such as cyclomethicone and dimethicone, esters such as isopropyl myristate or dibutyl phthalate, long chain fatty alcohols such as stearyl alcohol and glycols such as propylene glycols, etc. These too could be dispensed in the form of a roll-on applicator.

In a similar fashion, the antiperspirant combinations of this invention, in form of a solution, could be formulated into emulsion type products to be dispensed from roll-on type applicators or aerosol dispensers or may be incorporated in creams, ointments. In the dry form, these materials can be included as the active ingredients in antiperspirant stick products or dispensed as a powder.

The quantity of the present antiperspirant combination, which may or may not contain the amino acid, that will be contained in products in accordance with the present invention will vary depending on the particular dosage form and the degree of activity required. Usually, however, on a dry basis it will comprise from about 3% to about 50% by weight based on the total weight of the composition and preferably, from about 15% to about 30% on the same weight basis.

The following Examples are given to further illustrate the present invention. It is understood, however, that the invention is not limited thereto.

#### EXAMPLE 1

##### *Preparation of SnAG A Powder*

In a glass beaker, 185 g. of glycine is added to 1910 g. of a 50% aqueous solution of aluminum chlorhydrate. The mixture is stirred by means of a magnetic stirrer until a clear solution is obtained. (This solution is called Solution I).

In another glass beaker, 860 g. of stannic chloride pentahydrate is added to 1209 g. of deionized water. The mixture is heated to approximately 50°C (by means of hot plate) and stirred until a clear solution is obtained. (This solution is called Solution II).

Solution I is slowly added to Solution II with stirring until a uniform, clear solution is obtained. SnAG A solid is obtained from the resultant aqueous SnAG A solution by evaporating the solution under vacuum (using a one stage vacuum pump at less than 10 torr) at 70°C by means of a Buchi Roto-Vapor. The resultant SnAG A solid is ground in a mortar and pestle and then redried for one hour at 70°C in the Roto-Vapor. The redried solid is then re-ground in a mortar and pestle and stored.

In an alternative procedure, the drying operation can be accomplished by spray drying the clear solution obtained from mixing Solution I and Solution II above. In this procedure, a Niro Atomizer is employed in which the inlet temperature is maintained at 200°C and the outlet temperature is maintained in the range of about 122°C to 130°C.

A 20% aqueous solution of the solid obtained from the above processes has a pH of 3.3; whereas, a 16% solution had a pH of 3.5.

**EXAMPLE 5**  
**Formula 1978**

|    | <i>Ingredients</i>  | <i>% by Wt.</i> |    |
|----|---|-----------------|----|
| 5  | SnAG A (powder)   | 48.00           | 5  |
|    | Deionized water   | 52.00           |    |
| 10 | Appearance: Clear to slightly hazy solution<br>Color: Water white to slightly yellow<br>pH: $2.3 \pm 0.5$<br>Total SnAG A in Formula $48.0 \pm 4.8\%$   |                 | 10 |
| 15 | The following Examples are given in tabular form (Table I). These illustrate a variety of aqueous compositions containing varying amounts of the ingredients contained in the antiperspirant combination of the present invention. The various mole ratios of materials are specified in the Table. |                 | 15 |

## EXAMPLE 6

## SnAG Suspension Roll-On 1944-3

|    | Ingredients              | % (w/w)      |
|----|--------------------------|--------------|
| 5  | Bentone 38               | 2.50         |
|    | Anhydrous Alcohol, SD-40 | 2.00         |
| 10 | SnAG A powder            | 24.00        |
|    | Cyclomethicone 7158      | 71.30        |
|    | Perfume                  | 0.20         |
| 15 |                          | <hr/> 100.00 |

## EXAMPLE 7

## SnAG Roll-On 1944-4

|    | Ingredients                                 | % (w/w)      |    |
|----|---|--------------|----|
| 20 | Polyoxypropylene fatty alcohol ethers, E-SP | 4.00         | 3  |
| 25 | Polyoxyethylene (2) stearyl ether           | 2.90         | 5  |
|    | Polyoxyethylene (20) stearyl ether          | 1.10         |    |
| 30 | Butylated hydroxytoluene                    | 0.05         | 30 |
|    | Disodium edetate, dihydrate                 | 0.10         |    |
|    | Deionized water                             | 67.35        |    |
| 35 | SnAG B powder                               | 24.00        |    |
|    | Perfume                                     | 0.30         |    |
| 40 | Color                                       | 0.20         |    |
|    |   | <hr/> 100.00 |    |

BHT } Standard  
EDTA } preservative  
mix (Mike  
17/7/00) 35

ratio  
concentrations  
various 40

## EXAMPLE 8

## 45 SnAG Solid Stick 1944-5

|    | Ingredients                   | % (w/w)      |    |
|----|-------------------------------|--------------|----|
|    | Stearyl alcohol               | 10.00        |    |
| 50 | Hydrogenated castor oil MP-80 | 3.00         | 50 |
|    | Paraffin Wax FT 300           | 3.00         |    |
| 55 | Butylated hydroxytoluene      | 0.05         | 55 |
|    | Cyclomethicone 7158           | 52.75        |    |
|    | Talc 5251                     | 7.00         |    |
| 60 | SnAG A powder                 | 24.00        | 60 |
|    | Perfume                       | 0.20         |    |
| 65 |                               | <hr/> 100.00 | 65 |

an effective antiperspirant quantity of the compositions defined in Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 or 15.

17. An antiperspirant combination according to claim 1, substantially as described in Example 1 or 2 herein.

5 18. A composition according to claim 9 or 12, substantially as described in Example 3, 3A, 4, 5, 6, 7 or 8, or Table I, herein. 5

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